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Paraplagusia longirostris, a New Flatfish (Cynoglossidae) from Australia and Papua New Guinea

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Abstract A new species of tongue sole, *Paraplagusia longirostris*, is described from 59 specimens (83.0–276.2 mm SL) collected off the northern coast of Australia and southern coast of Papua New Guinea. *P. longirostris* is easily distinguishable from other *Paraplagusia* by its long, obtusely pointed snout and its high counts for dorsal and anal fin rays, caudal vertebrae and mid-lateral line scales.

In his revision of the tongue sole genus *Paraplagusia*, Menon (1979) recognized three species. More recently, Gloerfelt-Tarp and Kailola (1984) and Sainsbury et al. (1985) reported on a *Cynoglossus* sp. captured off Australia. A closer look at the 10 voucher specimens deposited at the CSIRO by the above authors revealed that they belonged to an undescribed species of *Paraplagusia*. In 1987, the junior author (P.J.K.) sent one of us (F.C.) 15 unidentified cynoglossids from Papua New Guinea. Twelve of the 15 specimens turned out to belong to the same undescribed *Paraplagusia*. The purpose of this paper is to present a formal description of this new species.

Methods

Methods used for making counts and measurements follow those of Hubbs and Lagler (1964) with the following exceptions or additions: distance between tip of snout and commissure of mouth (horizontal line), distance between commissure of mouth and fleshy margin of opercle (horizontal line), number of proximal pterygiophores (including erisma) anterior to the neural spine of the third precaudal vertebra, number of papillae on the eyed-side lips, number of lateral lines on both sides of the body, number of scales on the mid-lateral line, number of scale rows between the mid-lateral and the upper lateral lines (diagonal count made where body depth is maximal, excluding lateral line scales), least fleshy interorbital space and fixed eye diameter (taken horizontally). Chapleau (1988a) suggested that the dorsalmost and ventralmost rays that have traditionally been included in the caudal fin ray counts of cynoglossids are probably the last ray of the dorsal and anal fin, respectively. This was hypothesized because, in several cynoglossids, these rays are similar structurally to dorsal and anal fin rays and because the base of each ray articulates not only with the epural or parhypural but also with the last proximal pterygiophore of the dorsal or anal fins, respectively. However, in order to compare our results with those of previous studies on the genus *Paraplagusia*, we have counted them here as caudal rays (not dorsal or anal fin rays). All remaining dorsal and anal fin rays we have counted as individual rays. Standard length was used throughout the study.

All measurements were made on the eyed side using dial calipers (to 0.1 mm). Vertebra, fin ray and proximal pterygiophore counts were made from X-rays.

The museum acronyms follow Leviton et al. (1985) and Leviton and Gibbs (1988). Note that since their move, "CSIRO" now stands for the Ian S. R. Munro Ichthyological Collection in Hobart, Tasmania (instead of the Division of Fisheries and Oceanography in Cronulla, New South Wales). Additionally, the National Museum of Natural Sciences (NMC) has changed its name to the Canadian Museum of Nature.

Paraplagusia longirostris sp. nov.
(Common name: Long-snouted tongue sole)
(Figs. 1–2)

Cynoglossus sp. 1: Gloerfelt-Tarp and Kailola, [1984]: 280 (fig.), 281, 360 (CSIRO CA2094: 13°18′S 128°21′E).

Cynoglossus sp.: Sainsbury et al., 1985: 298, 299 (fig.), 348 (CSIRO B2077: 13°46′S 128°14′E).

Holotype. WAM P.29719-001, 206.3 mm SL, Joseph Bonaparte Gulf, Western Australia, Australia, 13°51′S 128°48′E, 26 Dec. 1969, R.V. Umitaka Maru, 50 m, trawl.

Paratypes. WAM P.29719-001, 4 alcohol and 1 cleared and stained specimens, 202.3–242.7 mm SL, Joseph Bonaparte Gulf, Western Australia, Australia, 13°51′S 128°48′E, 26 Dec. 1969; R.V. Umitaka Maru, 50 m, trawl; WAM P.29753-001, 6 alcohol and 1 cleared and stained specimens, 93.7–217.4 mm SL, Joseph Bonaparte Gulf, Western Australia, Australia, 13°55′S 128°33′E, 26 Dec. 1969, R.V. Umitaka Maru, 52 m, trawl; AMS I.20402-002, 2 specimens, 115.8–181.4 mm SL, Admiralty Gulf, Bonaparte Archipelago, Western Australia, Australia, 14–15°S 124°45′–126°45′E, April 1978, C. O'Conner, 12–60 m, trawl; CSIRO CA2094, 1 specimen, 246.4 mm SL, north of Joseph Bonaparte Gulf, Western Australia, Australia, 13°18′S 128°21′E, 20 June 1980, 86 m, trawl; CSIRO CA2115, 1 specimen, 181.7 mm SL, north of Melville Island, Northern Territory, Australia, 11°04′S 131°18′E; NTM S.0055, 1 specimen, 276.2 mm SL, 6.4 km north of Jones Shoal, off Cobourg Peninsula, Northern Territory, Australia, 12 Sept. 1975, M.V. Gemini; NTM S.0059, 2 specimens, 213.5–237.3 mm SL, off Snake Bay, Melville Island, Northern Territory, Australia, 10°55′S 130°43′E, Sept. 1975, M.V. Gemini, 60 m, trawl; NTM S.10031-110, 3 specimens, 247.7–259.2 mm SL, north of Smith Point, Cobourg Peninsula, Northern Territory, Australia, 10°58′S 132°10′E, 18 Oct. 1981, H. Larson on M.V. N.R. Anson; NTM S.10173-001, 4 specimens, 176.0–257.5 mm SL, off Murganella Creek, Van Diemen Gulf, Northern Territory, Australia, 11°52′S 132°35′E, 26 Oct. 1977, Northern Territory Fisheries; KFRS F04130, 8 specimens, 156.8–180.5 mm SL, 3.2 km west of Oriomo River mouth, Papua, Papua New Guinea, 09°02′S 143°12′E, 12 April 1973, R. Moore; NMC 90-0204, 1 specimen, 253.3 mm SL, Katatai village, Papua, Papua New Guinea, 09°01′40″S 143°20′00″E, April 1973; NMC 90-0205, 1 specimen, 235.7 mm SL, western Papua, Papua New Guinea, 08°57′–09°07′S 141°15′–143°15′E, 27 March 1973.

Non-type material. WAM P. 14968-001, 1 specimen, 227.5 mm SL, Darwin area, Northern Territory, Australia, 12°27′S 130°50′E, 4 Sept. 1965, E. Barker; CSIRO B2077, 9 specimens, 106.4–177.8 mm SL (one specimen was too damaged to measure the SL), Joseph Bonaparte Gulf, west of Hyland Bay, Western Australia, Australia, 13°46′S 128°14′E, 28 June 1980, 66 m, trawl; NTM S.10063-001, 1 specimen, 83.0 mm SL, off King Creek, Shoal Bay, Northern Territory, Australia, 12°21′S 131°01′E, 17 April 1975, Northern Territory Fisheries; NTM S.10704-001, 4 specimens, 144.4–220.5 mm SL, Chambers Bay, Van Diemen Gulf, Northern Territory, Australia, 12°13′S 131°35′E, 5 May 1977, Northern Territory Fisheries, 12 m; NTM S. 0038, 2 specimens, 206.0–239.3 mm SL, north of Melville Island, Northern Territory, Australia, 16 Sept. 1975, M.V. Gemini; AMS I.21632-001, 3 specimens, 154.2–184.0 mm SL, Timor Sea, Western Australia, Australia, 14°05′S 127°45′E, July 1979, N. Sarti, 52 m, trawl; KFRS F01747, 1 specimen, 186.5 mm SL, Orokolo Bay, Gulf of Papua, Papua New Guinea, 07°54′S 145°20′E, Jan. 1969, trawl; KFRS F02516, 1 specimen, too damaged to measure the SL, Freshwater Bay, Gulf of Papua, Papua New Guinea, 08°06′S 146°00′E.

Diagnosis. A species of *Paraplagusia* which is readily distinguishable from all other species in the genus by the non-overlapping high counts for the following meristic features: dorsal and anal fin rays, caudal vertebrae and mid-lateral line scales (Table 1).

Description. Measurements and counts of all specimens examined (including the holotype and the 36 paratypes) are given in Table 2. Two of the counts for the voucher specimens of *Cynoglossus* sp. (=*Paraplagusia longirostris*) in Sainsbury et al. (1985) differ from our counts; namely, the presence of 9 caudal fin rays and 129–132 scales in the medial lateral line. We have re-examined the 9 voucher specimens which were the basis for these counts and have obtained the lower counts presented in Table 2. The body has a lanceolate shape with a tapering caudal region and an elongated and obtusely pointed snout bearing a long rostral hook that overhangs the mouth. The posterior tip of the rostral hook and the commissure of the mouth are posterior to a vertical line passing through the middle of the fixed eye in the holotype and all paratypes except for two specimens wherein the posterior tip of the rostral hook is anterior to a vertical line passing through the middle of the fixed eye. The head length and body depth are approximately one quarter of the standard length. The snout length is at least half of the head length. The eyes are situated on the left side of the body. The migrated eye (upper) is situated anteriorly relative to the fixed eye and is separated from it by a scaly interorbital space. A single, short, tubular nostril is present on the eyed side near the anterodorsal margin of the mouth, just anterior to the fixed eye. The anterior nostril on the blind side is a thin tube situated anterodorsally relative to the upper lip.

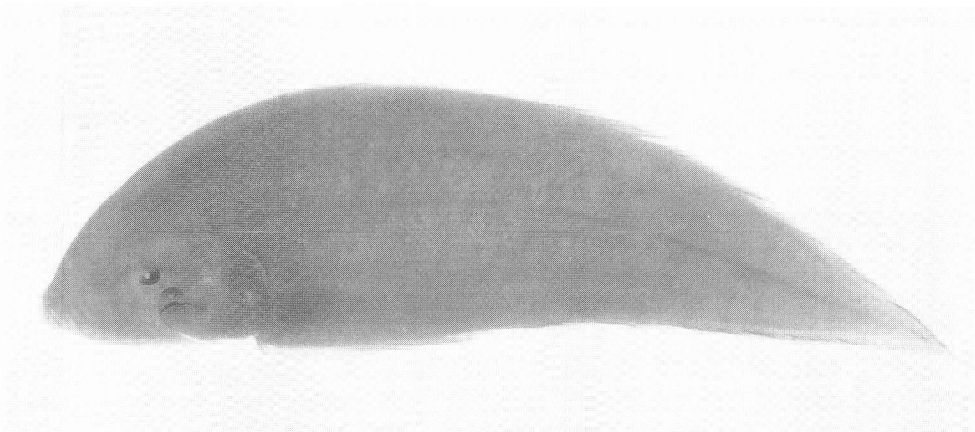

Fig. 1. *Paraplagusia longirostris* sp. nov., WAM P.29719-001, holotype, 206.3 mm SL, from Joseph Bonaparte Gulf, Western Australia, Australia.

The posterior nostril on the blind side is slit-like and is situated in the skin above the middle portion of the upper lip. The jaws are strongly asymmetrical and teeth are found only on the blind side premaxillary and dentary. The eyed-side lips bear a row of papillae. The upper lip papillae are few in number, small, unbranched and are generally found on the anterior portion of the lip (often hidden by a skin flap). The lower lip papillae are also unbranched, more numerous and usually larger than on the upper lip; and often, folded back onto the outside margin of the lip. The pectoral fins and the eyed-side pelvic fin are lacking. The blind side pelvic fin (with 4 rays) is in a ventral position and is membranously attached to the anal fin. The pelvic, anal, caudal and dorsal fins are confluent. The anus is situated on the blind side. Two lateral lines are on the eyed side and none are on the blind side. The upper lateral line sinuates gently near the dorsal margin of the body and curves dorsally near the end of the body to enter the dorsal fin. Ctenoid scales cover the body (blind side and eyed side including lateral lines).

Coloration in alcohol. The eyed-side body and head are uniformly pale brown (tan). The pelvic fin is unpigmented. The anal and dorsal fins exhibit increasing dark brown pigmentation toward the posterior end of the body. The caudal fin has pigmentation similar to the posterior end of the dorsal and anal fins. The fin pigmentation is visible on both sides of the fish. There is no pigmentation on the blind side of the body.

Distribution. *P. longirostris* is distributed along

Table 1. Range in meristic values in *Cynoglossus* species with a single nostril on the eyed side and in *Paraplagusia* species.

Species	Fin rays		Caudal vertebrae	Mid-lateral line scales	Source
	Dorsal	Anal			
C. capensis	108–110	85– 86	41–43	98–104	Menon (1977)
C. itinus	102–103	83– 86	41–43	71– 78	Menon (1977)
C. macrophtalmus	110–111	90– 91	44	100–103	Menon (1977)
C. microphtalmus	108	86	—	79	Menon (1977)
C. sealarki	112–116	92– 96	48	64– 66	Menon (1977)
C. zanzibarensis	116–121	94– 99	42–49	72– 76	Menon (1977)
P. bilineata	100–114	72– 89	36–43	75–109	Menon (1979)
P. blochi	77–100	70– 82	38–39	73– 90	Menon (1979) Ochiai (1963)
P. japonica	105–119	84– 97	41–43	88–109	Menon (1979) Ochiai (1963)
P. longirostris sp. nov.	133–143	102–112	49–55	115–125	this study

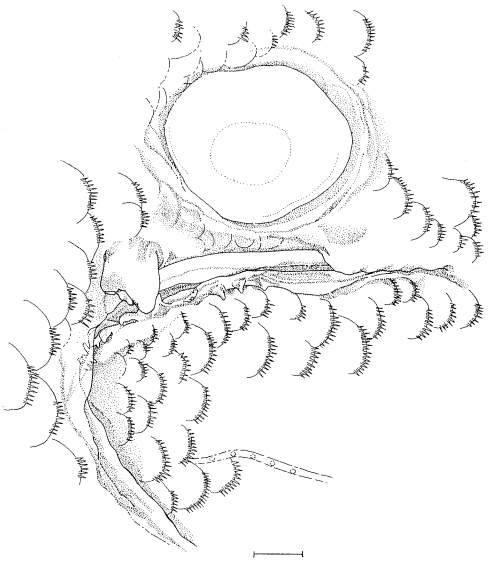

Fig. 2. Labial papillae in *Paraplagusia longirostris* sp. nov., WAM P.29719-001, holotype, 206.3 mm SL. Bar scale equals 1 mm.

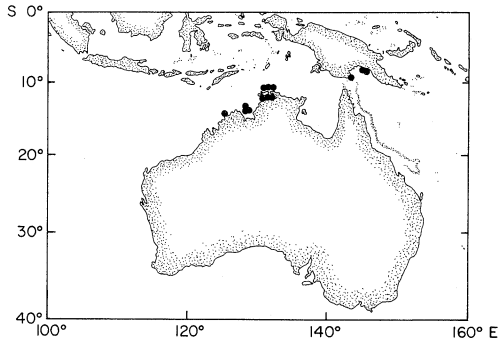

Fig. 3. Geographic distribution of *Paraplagusia longirostris* sp. nov. Some spots represent more than one collection.

the northern coast of Australia, from Admiralty Gulf (Western Australia) to Van Diemen Gulf (Northern Territory) and off Cobourg Peninsula (Northern Territory); and on the southern coast of Papua New Guinea in the Gulf of Papua and to the west, at depths between 12 and 86 m (Fig. 3).

Etymology. From the latin meaning "long snout".

Comparisons. *Paraplagusia longirostris* has small, labial papillae. Often, they are either folded back onto the external margin of the lower lip, or are hidden by a skin flap on the rostral hook which covers the anterior region of the upper and lower lips, making the papillae inconspicuous. Conse-

Table 2. Proportional measurements and counts in *Paraplagusia longirostris* sp. nov. (holotype in parentheses)

	N	Range	Mean	Standard deviation
Measurements				
Standard length (mm)	57	83.0–276.2 (206.3)	192.3	42.5
In % of standard length				
Head length	57	24.9–29.3 (27.0)	27.1	1.0
Body depth	57	23.5–28.6 (26.6)	25.9	1.1
In % of head length				
Eye diameter	57	5.7–8.8 (7.2)	7.2	0.8
Interorbital space	57	0.8–3.7 (2.5)	2.0	0.6
Snout length	57	50.0–60.0 (55.4)	55.2	1.9
Commissure of mouth to tip of snout	57	59.7–68.4 (65.2)	64.4	2.0
Opercular margin to commissure of mouth	57	31.6–40.3 (36.7)	36.7	6.5
Counts				
Dorsal fin rays	49	133–143 (141)	138.5	2.3
Anal fin rays	49	102–112 (110)	107.8	2.0
Caudal fin rays	49	6–8 (8)	7.9	0.3
Mid-lateral line scales	26	115–125 (119)	120.8	2.9
Rows of scales between lateral lines	39	14–17 (16)	15.8	0.7
Caudal vertebrae	51	49–55 (53)	53.0	1.0
Papillae (upper lip)	55	0–6 (3)	1.6	1.1
(lower lip)	56	0–12 (10)	6.2	3.1
(total)	55	1–18 (13)	7.8	3.5
Dorsal fin pterygiophores anterior to neural spine of third vertebra	57	17–20 (19)	18.0	0.8

quently, several specimens of *P. longirostris* in collections had been identified as *Cynoglossus*, a genus which lacks these papillae and that is sympatric with *P. longirostris*. Three of the collection-lots we examined contained both taxa (WAM P.29719-001, WAM P.14968-001, WAM P.29753-001). Furthermore, specimens of *P. longirostris* were found in the same collection-lot as *P. bilineata* (AMS I.20402-002). The high meristic counts (dorsal and anal fin rays, caudal vertebrae, mid-lateral line scales) coupled with the presence of a single nostril on the eyed side are sufficient to differentiate *P. longirostris* from all other cynoglossine species (*Paraplagusia* and *Cynoglossus*) revised by Menon (1977, 1979) and Ochiai (1963) (Table 1).

Chapleau (1988a, 1988b) defined *Paraplagusia* as a monophyletic genus on the basis of the following five apomorphic characters: (1) short triangular basihyal attached to the dorsal margin of the first ceratobranchial; (2) fringed (i.e. papillae bearing) lips on the eyed side; (3) teeth on the third infrapharyngobranchial wide and blunt; (4) posterior end of the first modified proximal pterygiophore of the dorsal fin (erisma) not extending farther than the frontals; and (5) ventral arm of the erisma very long. Examination of two cleared and stained specimens of *P. longirostris* (WAM P.29719-001, 202.3 mm SL and WAM P.29753-001, 199.3 mm SL) showed that all of these apomorphic characters are present in *P. longirostris* except for the dorsal fin's first modified proximal pterygiophore. This structure extends farther posteriorly than the frontals and terminates in a thin, spine-like process flattened on the posterior portion of the supraoccipital. This posterior extension of the erisma resembles the state observed in *Cynoglossus* and *Symphurus*: consequently, we believe that this character should be deleted from the monophyletic definition of the genus *Paraplagusia*.

The type of labial papillae observed in *Paraplagusia* is unprecedented within the flatfishes. Hensley and Suzumoto (1990) pointed out the presence of papillae on the upper and lower lips in the bothid *Engyprosopon arenicola*. Chabanaud (1928) mentioned the presence of papillae on the eyed-side, lower lip of numerous achirid species. However, the papillae in both these taxonomic groups differ structurally from those found in *Paraplagusia*. Finally, in the light of our knowledge of the phylogenetic relationships within the flatfishes (Chapleau and Keast 1988, Hensley and Ahlstrom 1984), the most parsimonious explanation is that labial papillae must have evolved independently in several lineages of flatfishes.

Comparative material. *Paraplagusia bilineata*: AMS I. 20402-002, 1 specimen, 172.2 mm SL, Admiralty Gulf, Bonaparte Archipelago, Western Australia, Australia, 14–15°S 124°45′–126°45′E, April 1978, C. O'Conner, 12–60 m, trawl.

Cynoglossus sp.: WAM P.29753-001, 3 specimens, 66.0–98.5+mm SL, Joseph Bonaparte Gulf, Western Australia, Australia, 13°55′S 128°33′E, 26 Dec. 1969, R.V.Umitaka Maru, 52 m, trawl. *Cynoglossus* sp.: WAM P.29719-001, 3 specimens, 84.1–154.9 mm SL, Joseph Bonaparte Gulf, Western Australia, Australia, 13°51′S 128°48′E, 26 Dec. 1969, R.V. Umitaka Maru, 50 m, trawl. *Cynoglossus bilineatus*: WAM P.14968-001, 4 specimens, 218.0–280.0 mm SL, Darwin area, Northern Territory, Australia, 12°27′S 130°50′E, 4 Sept. 1965, E. Barker.

Acknowledgments

Paul Brunon and Jacques Hélie, University of Ottawa, who respectively took the photograph and drew the map. Susan Laurie-Bourque drew Fig. 2. Elsa Gagnon and Alison Murray, Canadian Museum of Nature, took the X-rays. Our sincere thanks to the following persons who provided specimens: Barry Russell, Helen K. Larson and Rex S. Williams, NTM; Gerald R. Allen, Kevin Smith and Nick Haigh, WAM; Peter Last and Justine O'Regan, CSIRO; John Paxton and Mark McGrouther, AMS. This work was partially supported by an operating grant to F. Chapleau by the Natural Sciences and Engineering Research Council (NSERC) and to C. B. Renaud by the Canadian Museum of Nature Research Committee.

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オーストラリアとパプア・ニューギニアから得られたウシノシタ科タイワンシタビラメ属の1新種 *Paraplagusia longirostris*

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オーストラリア北部とパプア・ニューギニア沿岸沖から採集された59個体の標本 (83.0–276.2 mm) に基づいて，ウシノシタ科タイワンシタビラメ属の新種 *Paraplagusia longirostris* を記載した．本種は長くて鈍く尖った吻をもつこと，背鰭条数，臀鰭条数，尾椎骨数および側線鱗数が多いことにより，同属の他種と容易に区別できる．有眼側の口唇にある小乳頭状突起は，上唇には僅しかなく，小さくて不分枝である．下唇の小乳頭状突起も不分枝であるが，上唇のそれらより大きくて数が多い．